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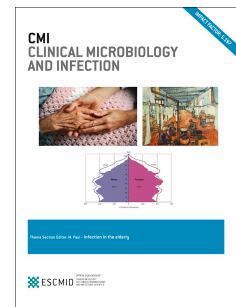
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RESEARCH NOTEProphylactic anticoagulation with low molecular weight heparin in
COVID-19: cohort studies in Denmark and Sweden

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Abstract

Objectives. To evaluate safety and effectiveness of prophylactic anticoagulation with low molecular weight heparin (LMWH) in individuals hospitalised for COVID-19.

Methods. Using healthcare records from the capital region of Denmark (March 2020-February 2021) and Karolinska University Hospital in Sweden (February 2020-September 2021), we conducted an observational cohort study comparing clinical outcomes 30 days after admission among individuals hospitalised for COVID-19 starting prophylactic LMWH during the first 48 hours of hospitalisation with outcomes among those not receiving prophylactic anticoagulation. We used inverse probability weighting to adjust for confounders and bias due to missing information. Risk ratios, risk differences and robust 95% confidence intervals (CI) were estimated using binomial regression. Country-specific risk ratios were pooled using random-effects meta-analysis.

Results. We included 1692 and 1868 individuals in the Danish and Swedish cohorts. Of these, 771 (46%) and 1167 (62%) received prophylactic LMWH up to 48 hours after admission. The combined mortality in Denmark and Sweden was 12% (N=432) and the pooled risk ratio was 0.89 (CI 0.61-1.29) comparing individuals who received LMWH to those who did not. The relative risk of ICU admission was 1.12 (CI 0.85-1.48), while we observed no increased risk of bleeding (RR 0.60, 0.14-2.59). The relative risk of venous thromboembolism was 0.68 (CI: 0.33-1.38) in Sweden. Less than 5 VTE events were observed among individuals receiving LMWH in Denmark, preventing a meaningful analysis.

56 **Conclusion.** We found no benefit on mortality with prophylactic LMWH and no increased
57 risk of bleeding among COVID-19 patients receiving prophylactic LMWH.

Journal Pre-proof

58 Introduction

59 High rates of venous thromboembolism (VTE) were initially reported in individuals
60 hospitalised for coronavirus disease 2019 (COVID-19) [1] and guidelines for prophylactic
61 anticoagulation in COVID-19 were quickly established [2,3]. Newer and population-based
62 studies, however, reported lower rates of VTE [4]. Randomized trials on prophylactic
63 anticoagulation in COVID-19 are ongoing [5], with available results suggesting no benefit
64 on mortality when comparing intermediate- to full dose anticoagulation in critically ill
65 patients [6,7]. While full-dose anticoagulation may be superior to prophylactic dose in
66 non-critically ill patients [8,9], conflicting results have been reported [10]. An observational
67 study comparing prophylactic anticoagulation to no anticoagulation also indicated a
68 beneficial effect on mortality [11]. We aimed to provide additional evidence by analysing
69 clinical outcomes among COVID-19 patients receiving prophylactic low-molecular weight
70 heparin (LMWH) compared to individuals receiving no anticoagulation.

71

72 Methods

73 We conducted a cohort study using the electronic health records systems from the Capital
74 Region of Denmark and from Karolinska University Hospital, an academic two-site
75 tertiary hospital with 1100 beds, in the Stockholm region in Sweden. Patients were
76 included until 06 February 2021 in Denmark and 31 August 2021 in Sweden. We included
77 all individuals with a positive reverse transcriptase polymerase chain reaction test (RT-
78 PCR) for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) between 14 days
79 before and 24 hours after admission for COVID-19. Individuals were excluded if they were

below 18 years of age, were current users of anticoagulants, had major bleeding during the previous year, were hospitalised for less than 24 hours, or if they within 48 hours of hospitalisation experienced an outcome of interest or received multiple types of anticoagulation. Individuals were classified as receiving prophylactic LMWH (≤ 5000 IU dalteparin, 4500 IU tinzaparin or 40 mg enoxaparin) or not during the first 48 hours of hospitalisation. In the main analysis, individuals were followed from 48 hours until 30 days after admission, regardless of changes in exposure status (**web-only supplementary figure S1**). Outcomes were death, intensive care unit admission, receiving a discharge diagnosis of VTE and bleeding. For covariate adjustment, we obtained information on selected hospital diagnoses during the 10 years prior to admission, prescription drug use during the prior year, clinical measurements, and results of blood tests at admission (**supplementary table S1**).

Statistical analyses

Bias due to missing information was handled by inverse probability (IP) weighting of complete cases [12], while measured confounders were adjusted for by IP of treatment weighting [13] (**table S2**). Covariate balance was assessed using standardised mean differences [14]. IP-weights greater than 4 were truncated. Using binomial regression, we obtained crude and IP-weighted risk differences (RD) and -ratios (RR), with robust 95% confidence intervals, comparing individuals who received LMWH in prophylactic doses to individuals not receiving anticoagulation. Country-specific RRs were pooled using a random effects meta-analysis model.

In sensitivity analyses, we (i) shortened the exposure assessment window to 24 hours, (ii) adjusted for body mass index (omitted from the main analysis due to a high prevalence of missing information in Sweden), (iii) restricted inclusion in Sweden to February 2021 (matching data availability in Denmark), (iv) considered initiation of therapeutic dose LMWH an outcome as a proxy for VTE, and (v) obtained risk estimates among patients who received in-hospital corticosteroid treatment. Statistical analyses were performed using R. The source code is available from <https://gitlab.sdu.dk/lclund/lmwh-covid19/>.

Ethics

The study was approved by the Danish Patient Safety Authority and the Danish Data Protection Agency. Ethics committee approval and informed consent were not required by Danish law. In Sweden, the study was approved by the Regional Ethical Review Board in Stockholm.

Results

We identified 3483 individuals hospitalised for COVID-19 in Denmark and 3919 individuals in Sweden, of whom 1692 (49%) and 1868 (48%) were included in the final study cohorts (**figure S2**). The median age was 72 and 58 years in the Danish and Swedish cohort. Overall, 1938 individuals (54%) received prophylactic LMWH and 1622 individuals (46%) received no anticoagulation. The proportion of individuals who received prophylactic LMWH in Denmark increased from <10% in March 2020 to about 60% and in Sweden over 80% at the end of the study period (**figure S3**). Individuals receiving

prophylactic LMWH more often received oxygen therapy and in-hospital glucocorticoid treatment for COVID-19 (**table 1**). Individuals with missing information were generally younger, more often female, and more healthy than complete cases (**table S3**). After IP-weighting, the abovementioned characteristics were balanced, except for a slight imbalance in in-hospital corticosteroid treatment (**figure S4, table S4**). In the combined population, we observed 432 deaths within 30 days of hospitalisation for COVID-19 (mortality: 12%) and 60 patients had a discharge diagnosis of VTE (1.7%) (**table S5**). We observed 211 deaths (risk 11%) among individuals who received prophylactic LMWH compared to 221 deaths among those who did not (14%; pooled IP-weighted risk ratio [RR] 0.89, 95% CI 0.61-1.29). The relative risk of being admitted to the ICU was 1.12 (0.85-1.48). In the Swedish cohort, the risk of receiving a VTE diagnosis was non-significantly lowered among individuals who received prophylactic LMWH (RR 0.68, 0.33-1.38). We observed too few VTE diagnoses among individuals receiving LMWH in the Danish cohort ($n < 5$) to obtain stable risk estimates. Finally, we observed no increased risk of receiving a discharge diagnosis related to bleeding (RR 0.60, 0.14-2.59) (**figure 1**).

In sensitivity analyses, we observed comparable risk estimates when shortening the exposure assessment window to 24 hours, restricting the inclusion period in Sweden, when adjusting for body mass index or stratifying on in-hospital corticosteroid treatment (**table S6**). In accordance with the other outcomes, the RR for initiating therapeutic LMWH was not increased (RR_{Denmark} 0.99, 0.63-1.57; RR_{Sweden} 1.52, 0.87-2.67).

Discussion

146 We report no beneficial effect on mortality and the risk of ICU admission with use of
147 LMWH thromboprophylaxis in patients admitted for COVID-19. The risk of receiving a
148 VTE diagnosis was lower when receiving LMWH, albeit with imprecise risk estimates, and
149 the risk of bleeding was not increased.

150 The main strength of our study is the ability to include rich information on clinical and
151 biochemical measurements using electronic health records based data sources from
152 multiple hospitals, spanning two countries. The major limitation of our study is its non-
153 randomised nature. Even though Danish and Swedish guidelines recommend
154 prophylactic anticoagulation for almost all patients admitted for COVID-19, physicians
155 target treatment to patients at particular risk of VTE. This introduces confounding, as the
156 higher risk patients will be treated, while the lower risk patients remain untreated.

157 Although this potential bias was addressed in our statistical analysis, we cannot rule out
158 some residual confounding, e.g., by suboptimal model specification and measurement of
159 covariates. Finally, we included as reference not only individuals not receiving
160 anticoagulation, but also late initiators (>48 hours post-admission). We made this choice,
161 as censoring unexposed individuals upon initiation of LMWH would introduce
162 informative censoring, as late initiation may be a sign of adverse clinical outcomes.

163 The finding that prophylactic anticoagulation with LMWH thromboprophylaxis does not
164 reduce mortality is not in alignment with results from a similar observational study [11].
165 This could be attributed to lower statistical precision or residual confounding in our study
166 but may also be related to the different populations and baseline risk of VTE. Comparison
167 of our risk estimates with the published randomised controlled trials conducted in non-

critically ill patients is difficult, as these lacked a comparison group not receiving anticoagulants. One of the three trials in non-critically ill patients reported null-findings in accordance with our results [10].

Conclusion

In these cohort studies, we found no beneficial effect of prophylactic LMWH on mortality or the risk of ICU admission in patients hospitalised for COVID-19. The risk of VTE was reduced among individuals receiving prophylactic anticoagulation, albeit with low statistical precision, while patients receiving prophylactic anticoagulation were not at an increased risk of bleeding events.

Author contributions

Conceptualization: LCL and JH.

Methodology: All authors.

Data curation: AHA, PH

Software: AHA, PH, LCL

Formal analysis: PH, LCL

Resources: JP, EJS, JH

Writing – original draft: LCL, JH

Writing – Review & Editing: All authors.

Conflicts of interest

190 LCL reports participation in research projects funded by Menarini Pharmaceuticals and
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202

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References

- [1] Klok FA, Kruip MJHA, van der Meer NJM, Arbous MS, Gommers D, Kant KM, et al. Confirmation of the high cumulative incidence of thrombotic complications in critically ill ICU patients with COVID-19: An updated analysis. *Thromb Res* 2020;191:148–50. <https://doi.org/10.1016/j.thromres.2020.04.041>.
- [2] Dansk Selskab for Trombose og Hæmostase. Forebyggelse og behandling af trombose og blødning hos COVID-19 patienter 2021.
- [3] Riktlinjer för profylax och behandling av venös tromboembolism hos patienter med covid-19 n.d. <https://janusinfo.se/behandling/expertgruppsutlatanden/koagulationssjukdomarochplasma produkter/koagulationssjukdomarochplasma produkter/riktlinjerforprofylaxoch behandlingavvenostromboembolismhospatientermedcovid19.5.735b5f221714e865c978301e.html> (accessed November 23, 2021).
- [4] Dalager-Pedersen M, Lund LC, Mariager T, Winther R, Hellfritsch M, Larsen TB, et al. Venous thromboembolism and major bleeding in patients with COVID-19: A nationwide population-based cohort study. *Clin Infect Dis Off Publ Infect Dis Soc Am* 2021. <https://doi.org/10.1093/cid/ciab003>.
- [5] Flumignan RL, Tinôco JD de S, Pascoal PI, Areias LL, Cossi MS, Fernandes MI, et al. Prophylactic anticoagulants for people hospitalised with COVID-19. *Cochrane Database Syst Rev* 2020;2020:CD013739. <https://doi.org/10.1002/14651858.CD013739>.
- [6] INSPIRATION Investigators. Effect of Intermediate-Dose vs Standard-Dose Prophylactic Anticoagulation on Thrombotic Events, Extracorporeal Membrane

- 227 Oxygenation Treatment, or Mortality Among Patients With COVID-19 Admitted to
 228 the Intensive Care Unit: The INSPIRATION Randomized Clinical Trial. JAMA
 229 2021;325:1620–30. <https://doi.org/10.1001/jama.2021.4152>.
- 230 [7] The REMAP-CAP, ACTIV-4a, and ATTACC Investigators. Therapeutic
 231 Anticoagulation with Heparin in Critically Ill Patients with Covid-19. N Engl J Med
 232 2021;385:777–89. <https://doi.org/10.1056/NEJMoa2103417>.
- 233 [8] Sholzberg M, Tang GH, Rahhal H, AlHamzah M, Kreuziger LB, Áinle FN, et al.
 234 Effectiveness of therapeutic heparin versus prophylactic heparin on death,
 235 mechanical ventilation, or intensive care unit admission in moderately ill patients
 236 with covid-19 admitted to hospital: RAPID randomised clinical trial. BMJ
 237 2021;375:n2400. <https://doi.org/10.1136/bmj.n2400>.
- 238 [9] ATTACC Investigators, ACTIV-4a Investigators, REMAP-CAP Investigators, Lawler
 239 PR, Goligher EC, Berger JS, et al. Therapeutic Anticoagulation with Heparin in
 240 Noncritically Ill Patients with Covid-19. N Engl J Med 2021;385:790–802.
 241 <https://doi.org/10.1056/NEJMoa2105911>.
- 242 [10] Lopes RD, de Barros E Silva PGM, Furtado RHM, Macedo AVS, Bronhara B, Damiani
 243 LP, et al. Therapeutic versus prophylactic anticoagulation for patients admitted to
 244 hospital with COVID-19 and elevated D-dimer concentration (ACTION): an open-
 245 label, multicentre, randomised, controlled trial. Lancet Lond Engl 2021;397:2253–63.
 246 [https://doi.org/10.1016/S0140-6736\(21\)01203-4](https://doi.org/10.1016/S0140-6736(21)01203-4).
- 247 [11] Rentsch CT, Beckman JA, Tomlinson L, Gellad WF, Alcorn C, Kidwai-Khan F, et al.
 248 Early initiation of prophylactic anticoagulation for prevention of coronavirus disease

- 249 2019 mortality in patients admitted to hospital in the United States: cohort study. *BMJ*
250 2021;n311. <https://doi.org/10.1136/bmj.n311>.
- 251 [12] Perkins NJ, Cole SR, Harel O, Tchetgen Tchetgen EJ, Sun B, Mitchell EM, et al.
252 Principled Approaches to Missing Data in Epidemiologic Studies. *Am J Epidemiol*
253 2018;187:568–75. <https://doi.org/10.1093/aje/kwx348>.
- 254 [13] Robins JM, Hernán MA, Brumback B. Marginal structural models and causal
255 inference in epidemiology. *Epidemiol Camb Mass* 2000;11:550–60.
256 <https://doi.org/10.1097/00001648-200009000-00011>.
- 257 [14] Austin PC. Balance diagnostics for comparing the distribution of baseline covariates
258 between treatment groups in propensity-score matched samples. *Stat Med*
259 2009;28:3083–107. <https://doi.org/10.1002/sim.3697>.

Table 1. Baseline characteristics of individuals receiving prophylactic LMWH and those not receiving prophylactic anticoagulation for the capital regions of Denmark and Sweden

	Denmark			Sweden		
	Prophylactic LMWH (N=771)	No anticoagulation (N=921)	Miss- ing	Prophylactic LMWH (N=1167)	No anticoagulation (N=701)	Miss- ing
Demographics						
Age, median [IQR]	72.00 [59.00, 82.00]	72.00 [56.00, 81.00]	-	60.00 [47.00, 73.00]	55.00 [36.00, 70.00]	-
Male sex	412 (53)	465 (50)	-	658 (56)	349 (50)	-
Time period			-			-
Before June 2020	94 (12)	525 (57)		414 (36)	363 (52)	
June to October 2020	119 (15)	74 (8)		122 (11)	94 (13)	
November 2020 to February 2021	558 (72)	322 (35)		383 (33)	149 (21)	
March to June 2021	-	-		216 (19)	90 (13)	
July 2021 to August 2021	-	-		32 (3)	5 (1)	
Clinical measurements						
Body mass index			16			50
<18.5	34 (5)	31 (4)		22 (4)	8 (3)	
18.5-24	230 (34)	256 (35)		203 (33)	133 (41)	
25-34	343 (51)	398 (54)		366 (59)	163 (51)	
35+	69 (10)	56 (8)		30 (5)	17 (5)	
Smoking history			29			100
Ex-smoker	287 (53)	299 (45)		-	-	
Current smoker	55 (10)	70 (10)		-	-	
Body temperature, C			<1			9
37.5-38.4	219 (28)	266 (29)		353 (31)	165 (29)	
38.5+	194 (25)	192 (21)		358 (32)	115 (20)	
Respiratory frequency/min > 22	305 (40)	280 (31)	<1	527 (47)	215 (38)	9
Systolic blood pressure < 100 mmHg	26 (3)	42 (5)	<1	41 (4)	22 (4)	9
Reduced peripheral oxygen saturation, %			7			16

<88	40 (5)	15 (2)		55 (5)	27 (5)	
88-92	122 (17)	100 (12)		199 (19)	65 (13)	
Oxygen therapy, l/min			3			11
1-4	280 (37)	200 (23)		437 (39)	139 (25)	
5+	76 (10)	51 (6)		102 (9)	32 (6)	
Biochemical measurements						
Estimated GFR l/min/1.73m ²			3			10
30-59	101 (13)	119 (13)		192 (17)	115 (20)	
15-29	37 (5)	36 (4)		51 (5)	35 (6)	
<15	11 (1)	8 (1)		21 (2)	8 (1)	
Haemoglobin below reference	289 (38)	335 (37)	2	333 (30)	186 (32)	9
Leukocyte levels			3			8
Below reference	183 (24)	226 (25)		81 (7)	51 (9)	
Above reference	49 (6)	52 (6)		214 (19)	174 (29)	
Thrombocyte levels			3			9
Below reference	100 (13)	130 (15)		175 (16)	93 (16)	
Above reference	76 (10)	84 (10)		54 (5)	22 (4)	
Elevated D-dimer*	355 (66)	323 (67)	40	705 (72)	234 (70)	30
Prescription drug use prior to hospitalisation						
Platelet inhibitors	193 (25)	226 (25)	-	125 (11)	71 (10)	-
Antihypertensives	346 (45)	400 (43)	-	312 (27)	175 (25)	-
Loop diuretics	115 (15)	116 (13)	-	89 (8)	69 (10)	-
Glucose lowering therapy	176 (23)	171 (19)	-	206 (18)	111 (16)	-
Lipid lowering therapy	235 (30)	273 (30)	-	189 (16)	84 (12)	-
Glucocorticoids	191 (25)	91 (10)	-	277 (24)	122 (17)	-
In-hospital dexamethasone treatment	505 (65)	158 (17)	-	381 (33)	108 (15)	-
Medical history						
VTE	6 (1)	11 (1)	-	-	-	-
Atrial fibrillation	15 (2)	31 (3)	-	12 (1)	15 (2)	-
Heart valve disease	34 (4)	39 (4)	-	15 (1)	16 (2)	-
Cardiovascular disease	188 (24)	204 (22)	-	165 (14)	95 (14)	-

Heart failure	57 (7)	55 (6)	-	56 (5)	38 (5)	-
Ischaemic stroke	58 (8)	66 (7)	-	28 (2)	21 (3)	-
Current cancer	76 (10)	81 (9)	-	90 (8)	73 (10)	-
Pulmonary disease	172 (22)	185 (20)	-	140 (12)	71 (10)	-
Liver disease	15 (2)	20 (2)	-	39 (3)	27 (4)	-

LMWH: Low molecular weight heparin; GFR: Glomerular filtration rate; VTE: Venous thromboembolism

*Age-specific cut-offs between 0.5 and 0.8 FEU/l

Figure 1. Inverse probability weighted number of events, risks and risk estimates for effectiveness and safety outcomes in Denmark, Sweden and combined.

LMWH: Low molecular weight heparin; Ref.: Reference cohort not receiving anticoagulation; RR: Risk ratio; RD: Risk difference; ICU: Intensive care unit; VTE: Venous thromboembolism

🇩🇰 Capital region of Denmark, 🇸🇪 Stockholm region of Sweden

